

Department: Botany
Year: Second – level
Section: Chemistry / Microbiology
Course Code: N208
Course Title: BIOLOGY OF ALGAE
Term: Second, 2014/2015
Date: 4 /6/2015
Time Allowed: 1 hours
Total points: 60
Professor(s) Name(s): Dr. Wael M. EL Sayed



Answer the following questions

Question 1: Mark correct (✓) or wrong (X) of the following: (2 marks/point)

- A. Chlorophyll a is the primary photosynthetic pigment in all algae.
- B. The middle layer of Frustule composed of large quantities of amino acids.
- C. Fructosans are the higher molecular weight storage products found in the algal cells.
- D. Asexual reproduction is usually absent in Diatoms.
- E. *Chlorella* reproduces sexually by formation of autospores.
- F. Foliose algae consist of a sheet of single cell in thickness.
- G. Hormogonia of *Oscillatoria* are formed between two Heterocysts.
- H. *Codium* are considered as branched filamentous algae.

Question 2: Compare without drawing between the following: (7 marks/point)

- A. Mesocaryotic and euocaryotic nuclear divisions in algae.
- B. Different colonies in order Volvocales.

Question 3: Choose the correct answer: (2 marks/point)

- A. Asexual reproduction of *Spirogyra* takes place by (conjugation – aplanospores - fragmentation).
- B. The dominant pigment in chromoplast is (Chl a – Chl b- Carotene).
- C. Most species of Cyanophyta are (fresh- marine- brackish) water algae.
- D. Plastids of Bacillariophyta are surrounded by (one- two- three) membrane(s) of endoplasmic reticulum.
- E. Except (Cyanophyta – Chlorophyta- Bacillariophyta) all algal divisions contain species provided with flagella.
- F. The Bacillariophycian cell wall composed of (one – two - three) layer(s).
- G. Highly resistant resting cells contain abundant reserve food in Cyanophyta are called (Heterocysts – Akinetes- Aplanospores).
- H. Algae living within the cell of other plants are called (epiphytic- endophytic- epizoid).

Question 4: Illustrate by drawing only the following: (7 marks/point)

- A. Binary fission of diatoms.
- B. Digeneric isomorphic life cycle of marine Chlorophycean algae.

Best Wishes

Dr. Wael M. EL Sayed



ملحوظة: الامتحان ثلاثة اسئله في اربع ورقات و الإجابة في نفس الورقة الإمتحانية

Question (1) (20 marks)

1.A- Put (✓) or (X)

- 1- Microbiology is the study of pathogenic and medical importance microorganisms only.
- 2- All microorganisms are pathogenic.
- 3- Microorganism can be used as a source of food and feed.
- 4- Yeast used in genetic engineering as a model of eukaryotic cell.
- 5- Alkalothermophilic bacteria grow better in pH 4.
- 6- Potassium (K) is one of important macronutrient for microbes.
- 7- In the process of anaerobic respiration, carbohydrate can be metabolised by a process that utilises oxidative phosphorylation via an electron transport chain, but instead of oxygen serving as the terminal electron acceptor a (usually) inorganic molecule such as nitrate or sulphate is used.
- 8- Effect of iodine as antimicrobial enhanced by being dissolved in ethanol.
- 9- Blue green algae are good example of eukaryotic microorganisms.
- 10- In chemoheterotrophs, organic compounds are the source of carbon and energy.

1.B- Complete the following

- 1- Facilitated diffusion is
- 2- and are used to sterilize heat-labile substances
- 3- There are two ways to generate ATP and
- 4- Prokaryotes respiration take place in
- 5- In eukaryotes the DNA complexed with protein.
- 6- The three-domain scheme of classification are
- 7- In Photoheterotrophs the carbon source is
- 8- We can estimate the viable cell number by
- 9- High concentration of salt or sugar kill microbes by
- 10- Disinfection is

Question 2 (20 marks)

2.A- Complete (define the term or give the definition with drawing if necessary)

Numerical taxonomy	
Growth curve	
Microbes with difference requirement to O ₂ classified to:	
	is the process by which all microorganisms present on or in an object are destroyed or removed
Chemoheterotrophs or Heterotrophs	
Importance of extremothermophilic micoorganisms	
Mode of Action of Ionizing Radiations in sterilization	
	Running throughout the cell and taking and up much of its volume, is a complex membrane system of flattened sacs. The presence of numerous ribosomes on their surface gives it role protein synthesis

2.B- In three items only compare between

Prokarotes	Eukaryotes
1	1
2	2
3	3

Active transport	Passive transport
1	1
2	2
3	3

Question 3 (20 marks)

3 A: "The microbial cell is a bag of enzymes"

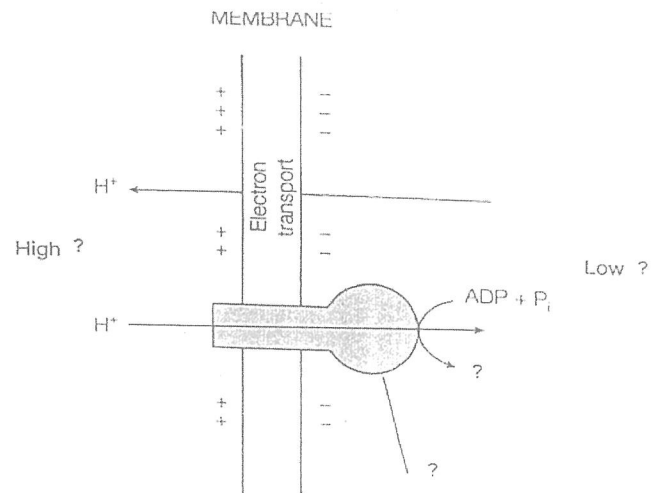
According to this fact answer the following question

What are enzymes and Its function?

Factors affecting enzymes activity: what and why?

Why microbes are important as enzyme producer?

3.B: Complete and comment the opposite figure



3.C: In the pack write on and discuss the factors affecting microbial growth.

With my deep and best wishes Dr. Mohammad Magdy

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Answer the following questions

Question 1: Write short notes on the following: (8 marks/point)

- a) Stationary and Logarithmic phase in growth curve of algae.
- b) Continuous and semi-continuous cultivation methods in algae.

Question 2: Illustrate the following with drawing only: (8 marks/point)

- a) Filamentous algae.
- b) Motile unicellular algae.

Question 3: Compare without drawing between the following: (8 marks/point)

- a) Storage products found in the algal cells.
- b) Mesocarpotic and euocarpotic nuclear division of algae.

Question 4: Choose the correct answer: (1.5 marks/point)

- a) The chief source of alginic acid is the large algae.
1- green 2- blue green 3- red 4- brown
- b) plays important role in the maintenance of plasma membrane.
1- Sodium 2- Sulfur 3- Calcium 4- Magnesium
- c) In solution containing NH_4NO_3 , algae preferred
1- nitrate 2- ammonia 3- nitric acid 4- both of them
- d) Silicon is important for the growth ofalgae.
1- green 2- red 3- diatoms 4- brown
- e) *Euglena gracilis* is used in the bioassay of
1- biotin 2- vitamin B₁ 3- vitamin B₆ 4- vitamin B₁₂
- f) Carrageenan is obtained from algae.
1- green 2- blue green algae 3- red 4- brown
- g) Blue green algae are used in reclamation of soils
1- acidic 2- alkaline 3- neutral 4- salinity
- h) Photosynthesis and growth of algae are stimulated by the addition of.....
1- Silicon 2- Iron 3- Manganese 4- Sodium

Best Wishes
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- 7- The term used to describe the type of solution in which cells will lose water to their environment is
- A. isotonic
 - B. hypotonic
 - C. hypertonic
 - D. catatonic
- 8- Osmosis always involves
- A. a selectively permeable membrane
 - B. a difference in solvent concentrations
 - C. active transport
 - D. A and B
- 9- If you have a new protein with molecular weight of 33000 Dalton, what is the expected number of amino acids residues in this protein?
- A. 200
 - B. 230
 - C. 300
 - D. 330
- 10- The specific features of water mainly due to
- A. Its low molecular wieght
 - B. Its low melting temperature
 - C. Its specific heat
 - D. Its hydrogen bonding
- 11- Ice floats on water because
- A. Ice denser than water
 - B. Ice have lower specific heat than water
 - C. Ice less dense than water
 - D. Water molecules have lattice structure
- 12- Which of the following compounds has the highest melting temperature
- A. CH_4
 - B. Ne
 - C. H_2O
 - D. NH_3
- 13- A lipid bilayer is permeable to
- A. Urea
 - B. Glucose
 - C. Fructose
 - D. Potassium
- 14- In the ice state, the water molecules form
- A. Tetrahedral network
 - B. Hexagonal lattice
 - C. clusters
 - D. Micelle

- 15- The following compounds are readily soluble in water EXCEPT
- A. Calcium Acetate
 - B. Sodium chloride
 - C. Glucose
 - D. Palmitic acid
- 16- Which of the following is NOT a nonpolar, aliphatic amino acid?
- A. Alanine
 - B. Cysteine
 - C. Leucine
 - D. Isoleucine
- 17- Which of the following amino acids contains sulfur?
- A. Methionine
 - B. Histidine
 - C. Leucine
 - D. Tyrosine
- 18- In protein separation using SDS-PAGE, if one band contains more than one protein what you expect?
- A. The proteins in the band have similar charges but differ in molecular weights
 - B. The proteins in the band have similar molecular weights but differ in charges
 - C. The proteins have different molecular weights and charges
 - D. None of the above
- 19- What protein structure refers to the arrangement of different polypeptide subunits in three-dimensional complexes?
- A. Primary
 - B. Secondary
 - C. Tertiary
 - D. Quaternary
- 20- In the active transport Na^+/K^+ ATPase pump, ____ Na^+ ion(s) is/are pumped out of the cell and ____ K^+ ion(s) is/are pumped into the cell.
- A. 2; 2
 - B. 3; 3
 - C. 3; 2
 - D. 3; 1
- 21- The optically inactive amino acid is
- A. Valine
 - B. Glycine
 - C. Serine
 - D. Threonine
- 22- Dopa (an acronym of 3,4-dihydroxyphenylalanine) is synthesized by hydroxylation of
- A. Threonine
 - B. Tyrosine
 - C. Histidine
 - D. Arginine

- 23- The technique for purification of proteins that can be made specific for a given protein is
- A. Gel filtration chromatography
 - B. Cation exchange chromatography
 - C. Electrophoresis
 - D. Affinity chromatography
- 24- The enzyme trypsin is specific for peptide bonds of
- A. Basic amino acids
 - B. Acidic amino acids
 - C. Aromatic amino acids
 - D. Small amino acid residues
- 25- Primary structure of a protein is formed by
- A. Hydrogen bonds
 - B. Peptide bonds
 - C. Disulphide bonds
 - D. All of these
- 26- Spherical aggregates of amphipathic compound in aqueous medium with their head groups facing toward the outside.
- A. Micelle
 - B. Vesicle
 - C. cluster
 - D. Clathrate
- 27- Which of the following is NOT a polar, uncharged amino acid?
- A. Cysteine
 - B. Glutamine
 - C. Serine
 - D. Threonine
- 28- Which of the following is NOT a charged amino acid?
- A. Lysine
 - B. Arginine
 - C. Glutamate
 - D. Valine
- 29- Primary structure of protein can be determined by the use of
- A. chromatography
 - B. Electrophoresis
 - C. Edman's reagent
 - D. All of the above
- 30- Sanger's reagent contains
- A. Phenylisothiocyanate
 - B. Dansyl chloride
 - C. 1-Fluoro-2, 4-dinitrobenzene
 - D. Ninhydrin

II– Differentiate between:

(20 marks)

- 1- Primary and secondary active transport processes.
- 2- Simple and conjugated proteins (Give example)
- 3- Size-exclusion chromatography and cation-exchange chromatography
- 4- Protein separation by SDS-Electrophoresis and isoelectric focusing

III- In Biochemistry laboratory you discover a new neuropeptide. After the isolation and purification of this peptide you find the following results:

- Complete acid hydrolysis followed by amino acid analysis indicated the presence of: 2 **glycine** (Gly), 2 **Lysine** (Lys), 2 **leucine** (Leu) and one **Tyrosine** (Tyr).
- Treatment of the peptide with 1-fluoro-2,4-dinitrobenzene followed by complete hydrolysis and chromatography indicated the presence of the 2,4-dinitrophenyl derivative of **tyrosine**.
- Digestion of the peptide with Trypsin followed by chromatography yielded 3 fragments:
 - **Tyr-Leu-Lys**,
 - **Gly-Lys**
 - **Leu-Gly**

From these data answer the following:

- 1- What is the N-terminal amino acid
- 2- What is the C-terminal amino acid
- 3- What is the sequence of this neuropeptide

(10 marks)

Good Luck